

# **LEVIII Update on SFTP II & Evaporative Emissions**



ARB Workshop  
November 16, 2010

# Emission Research Section

## Staff Changes

- Leela Rao, Acting Manager
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# **Fuel Fill Pipes and ORVR**

Leela Rao

Mobile Source Control Division

November 16, 2010

# Fuel Fill Pipes and Tank Openings

- Current standards last amended in 1990
- Standards contain outdated SAE specifications (J1114 and J829B)
- SAE standards were sunsetted and replaced with an ISO standard (13331-1995(E))
- Will update regulation to reflect changes to specifications
  - Specifications remove outdated definitions and design specifications (including figures), instead referring directly to ISO standard 13331-1995(E)

# Onboard Refueling Vapor Recovery (ORVR)

- ORVR regulations updated to align with EPA standards
  - Starting in 2014 ORVR requirements will apply to all vehicles < 10,001 lbs GVWR
- Carry-over allowed from 2013-2017
  - Consistent with LEVIII Evap. regulations
- Test procedures revised to reflect change in weight applicability and to allow use of CA certification fuel (E10) during testing

# **Evaporative Emissions**

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Mobile Source Control Division

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# Current LEV II

## Required Evaporative Emission Hydrocarbon Standards

Class of Vehicle	3-Day Diurnal + Hot Soak (grams per test)	2-Day Diurnal + Hot Soak (grams per test)	Running Loss (grams per mile)
PC	0.50	0.65	0.05
LDT: < 6000 lbs GVWR	0.65	0.85	0.05
LDT: 6000 – 8500 lbs GVWR	0.90	1.15	0.05
MDV: 8500 – 14000 lbs GVWR	1.00	1.25	0.05
HDV: > 14000 lbs GVWR	1.00	1.25	0.05

PC = Passenger Car  
LDT = Light Duty Truck

MDV = Medium Duty Vehicle  
HDV = Heavy Duty Vehicle

# Current LEV II

## Optional “Zero Evap” Emission Hydrocarbon Standards

Class of Vehicle	3-Day Diurnal + Hot Soak and 2-Day Diurnal + Hot Soak	
	Whole Vehicle (grams per test)	Fuel System Only (grams per test)
PC	0.35	0.0
LDT: < 6000 lbs GVWR	0.50	0.0
LDT: 6000 – 8500 lbs GVWR	0.75	0.0

- This path is used to acquire ZEV program credits



# Proposed LEV III Evaporative Emission Standards

- Extends zero evap standards to rest of fleet
- Manufacturers have choice of two compliance paths:
  - Option 1: Require certification to zero evap standards
    - Includes fuel system only “Rig” test
  - Option 2: Certify to slightly lower whole vehicle standards and Bleed Emissions Test Procedure (BETP)
    - BETP tests canister system and vehicle purge strategy
      - Preconditioned canister is attached to fuel tank and exposed to California 2-day diurnal temperature cycling
    - Does not include fuel system only “Rig” test

# Bleed Emissions Test Procedure (BETP)

- Carbon Canister System Stabilization to 4K-mile Test Condition
  - $\geq 10x$  purge / butane load cycling or driving on vehicle for 4K miles
- Carbon Canister System Stabilization to E10 Fuel Vapor
  - 10x purge / load cycling using E10 California Certification fuel vapor
- Fuel Tank Drain / Fill to 40% with E10 California Certification fuel and Soak at 65°F
- Carbon Canister Fill to Breakthrough
  - 2 g breakthrough using 50% butane
- Carbon Canister Purge
  - Bench purge or 2-day drive cycle
- Connect Carbon Canister to Fuel Tank (both at 65°F )
- CARB 2-Day Diurnal Temperature Cycling
- Hydrocarbon Capture of Canister Emissions
  - Connect canister outlet to sample bag or enclosure
- Quantify Daily Canister Venting Emissions

# Proposed LEV III

## Evaporative Emission Hydrocarbon Standards, Option 1

Class of Vehicle	3-Day Diurnal + Hot Soak and 2-Day Diurnal + Hot Soak		Running Loss (grams per mile)
	Whole Vehicle (grams per test)	Fuel System Only (grams per test)	
PC	0.350	0.0	0.05
LDT: < 6000 lbs GVWR	0.500	0.0	0.05
LDT: 6000 – 8500 lbs GVWR	0.750	0.0	0.05
MDV: 8500 – 14000 lbs GVWR	0.750	0.0	0.05
HDV: > 14000 lbs GVWR	0.750	0.0	0.05

# Proposed LEV III

## Evaporative Emission Hydrocarbon Standards, Option 2

Class of Vehicle	Highest* Diurnal + Hot Soak (grams per test)	Running Loss (grams per mile)	Bleed Emissions Test (grams per test)
PC, LDT1	0.300	0.05	.020
LDT2	0.400	0.05	.020
LDT3, LDT4	0.500	0.05	.020
MDV, HDV	0.600	0.05	.030

\* Highest value of 3-Day Diurnal + Hot Soak and 2-Day Diurnal + Hot Soak for a given certification test vehicle

- Light Duty Trucks < 6K GVWR:
  - LDT1: 0 – 3,750 LVW; LDT2: 3,751 – 5750 LVW
- Light Duty Trucks 6K – 8.5K GVWR:
  - LDT3: 3,751 - 5750 ALVW; LDT4: 5,751 – 8500 ALVW
- Medium Duty Vehicles (MDV) 8.5K – 14K GVWR
- Heavy Duty Vehicles (HDV) > 14K GVWR

# Fleet Average Within Option 2

- Option of complying with a fleet average (for each class of vehicle)
- This gives flexibility by allowing super clean vehicles to offset vehicles with higher emissions
- Family emission limits
  - Used in calculation of fleet average
  - Set in 50 mg increments by manufacturer
- Hydrocarbon credits
  - Apply to future model year fleet average (equalize debits)
  - Carry over of 5 years
- Hydrocarbon debits
  - Shall be equalized within 5 model years after incurred

# Phase-In Schedule

Model Years	Minimum Percentage of Vehicle Fleet Certified to Proposed Emission Standards
2014-2017	No specified requirement
2018, 2019	60
2020, 2021	80
2022	100

- No backsliding expected because OEMs will continue increasing production of zero-evap vehicles (PZEVs) to meet the ZEV requirement through 2017
- 2014 to 2017 model year vehicles applying for PZEV credit shall use the proposed LEV III evaporative emission standards

# New California Certification Fuel

- California certification fuel containing 10% ethanol (E10) shall be used for:
  - New vehicle certifications to the LEV III standards (non carry-over families) starting model year 2014
  - All vehicle certifications starting with model year 2018, no carry over allowed past 2017
- Federal fuel / test procedure allowance no longer applies

# Carry-over of 2013 MY Vehicles

- Carry over of MY 2013 zero-evap vehicles (PZEVs) allowed from 2014-2017
- For calculation of the manufacturer's fleet average, PZEVs will carry over at the following values:

Class of Vehicle	Highest Diurnal + Hot Soak (grams HC per test)
Passenger cars, LDT: < 6000 lbs GVWR and < 3750 lbs LVW	0.300
LDT: < 6000 lbs GVWR and 3751 – 5750 lbs LVW	0.400
LDT: 6000 – 8500 lbs GVWR	0.500



# Open Issues

- Bleed Emissions Test Procedure with Hybrid Electric Vehicles
  - Difficulty meeting standard due to lower purge
  - Considering test procedure modification or special allowance for these type of vehicles
  - Working with manufacturers individually on this
- Any questions?

# **Supplemental Federal Test Procedures II**

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# Light Duty Fleet ( $\leq 8,500$ lbs GVWR)

- 2 Options for SFTP II Compliance:
  - Option 1: FTP Linked
    - Individual US06 and SC03 Requirements to Certify Vehicles to LEV, ULEV, SULEV
    - Phase-In tied to FTP
  - Option 2: Fleet Average Composite Standard
    - SFTP II Composite =  $0.28 \times \text{US06} + 0.35 \text{ FTP} + 0.37 \times \text{SC03}$
    - Phase-In schedule independent of FTP

# Option 1: FTP Linked

## LEV III FTP

*Must Certify To...*

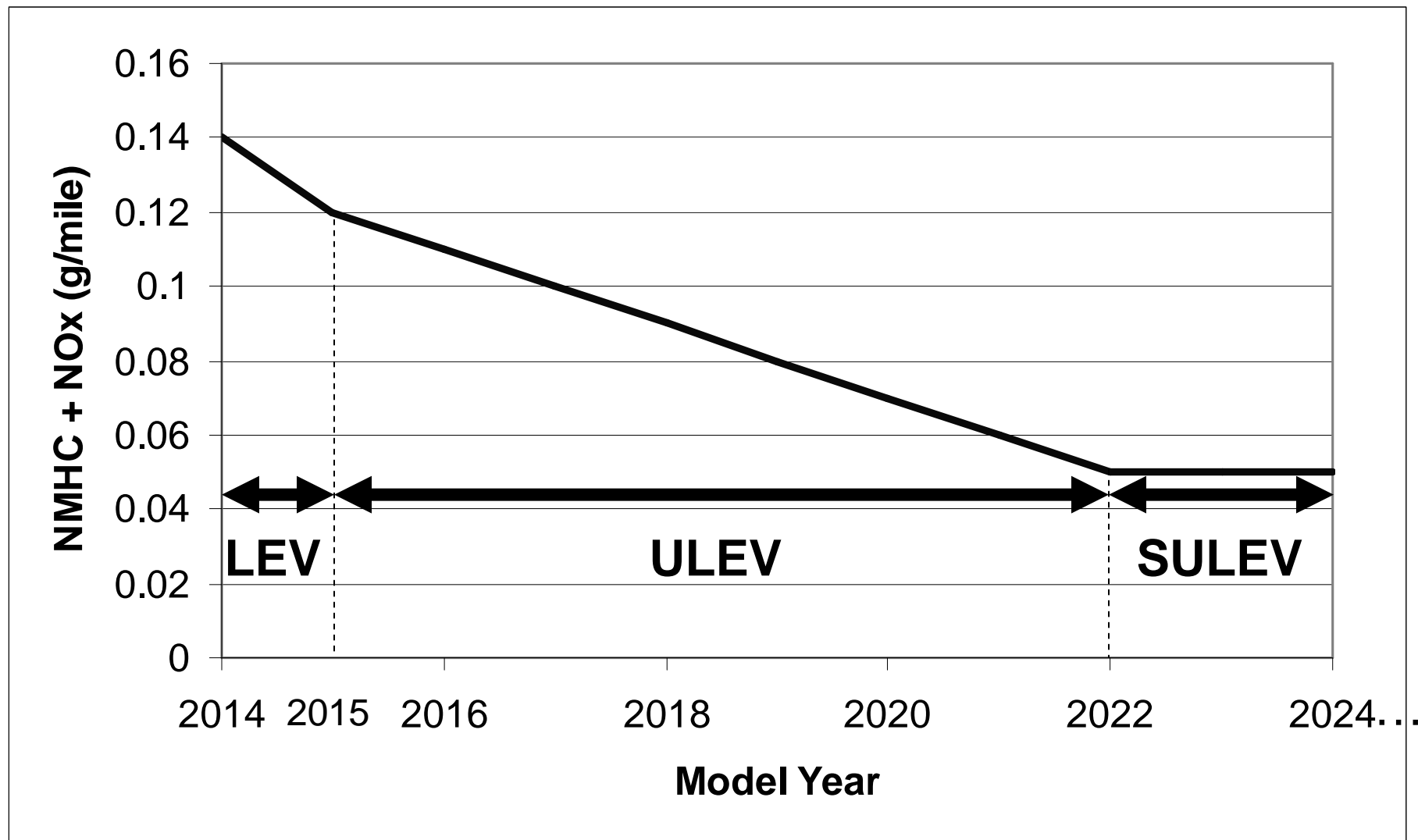
<b>LEV</b>
<b>ULEV</b>
<b>ULEV 70</b>
<b>ULEV 50</b>
<b>SULEV 30</b>
<b>SULEV 20</b>

## SFTP II

	<b>US06</b>		<b>SC03</b>	
	<b>NMHC + NO<sub>x</sub></b> (g/mile)	<b>CO</b> (g/mile)	<b>NMHC + NO<sub>x</sub></b> (g/mile)	<b>CO</b> (g/mile)
<b>LEV</b>	0.14	5.6	0.10	1.6
<b>ULEV</b>	0.12	5.6	0.07	0.9
<b>SULEV</b>	0.05	5.6	0.02	0.5

- Vehicles must certify to SFTP II categories based on their LEV III FTP certification

## Option 2: Fleet Avg. ( $\leq 8,500$ lbs GVWR)



- SFTP II Composite =  $0.28 \times \text{US06} + 0.35 \times \text{FTP} + 0.37 \times \text{SC03}$
- Certification bins from 0.01 to 0.18 g/mile for fleet averaging
- No combining of Option 1 and Option 2

# MDV Fleet (8,501 lbs to 14,000 lbs GVWR)

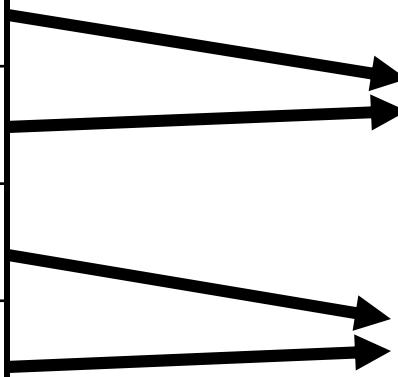
- LEV III FTP Linked MDV Phase-In
  - Similar to Option 1 for LDV compliance, but uses a composite average of 3 test cycles
  - 8,501-10,000 lb GVWR
    - SFTP II Composite =  
$$0.28 \times \text{US06} + 0.35 \times \text{FTP} + 0.37 \times \text{SC03}$$
  - 10,001-14,000 lb GVWR
    - SFTP II Composite =  
$$0.28 \times \text{UC (LA92)} + 0.35 \times \text{FTP} + 0.37 \times \text{SC03}$$

# FTP Linked for MDVs (8,501-10,000 lbs GVWR)

## LEV III FTP

*Must Certify To...*

<b>ULEV 250</b>
<b>ULEV 200</b>
<b>SULEV 170</b>
<b>SULEV 150</b>



## SFTP II

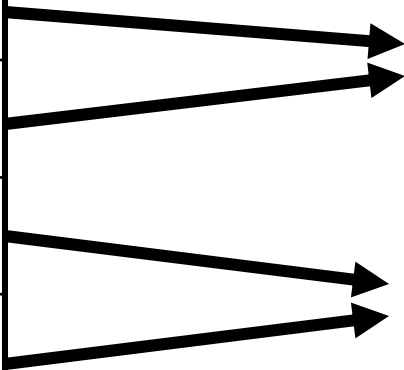
	<b>SFTP II = 0.28 x US06 + 0.35 x FTP + 0.37 x SC03</b>	
	<b>NMHC + NO<sub>x</sub> (g/mile)</b>	<b>CO (g/mile)</b>
<b>ULEV</b>	0.80	22.0
<b>SULEV</b>	0.45	12.0

# FTP Linked for MDVs (10,001-14,000 lbs GVWR)

## LEV III FTP

*Must Certify To...*

<b>ULEV 400</b>
<b>ULEV 270</b>
<b>SULEV 230</b>
<b>SULEV 200</b>



## SFTP II

	<b>SFTP II = 0.28 x UC (LA92) + 0.35 x FTP + 0.37 x SC03</b>	
	<b>NMHC + NO<sub>x</sub> (g/mile)</b>	<b>CO (g/mile)</b>
<b>ULEV</b>	0.550	6.0
<b>SULEV</b>	0.350	4.0



# FTP Alignment

- Section 177 State Pooling
- 150,000 mile durability
- Credits/Debits
- Interim In-Use

# Remaining Issues

- Drive Cycle selection of US06 cycle or 'Highway' portion of US06 for 8,501-10,000 GVWR MDVs
- Preconditioning procedures for MDV cycles
- Provisions for small volume manufacturers and independent low volume manufacturers

# Staff Contacts

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